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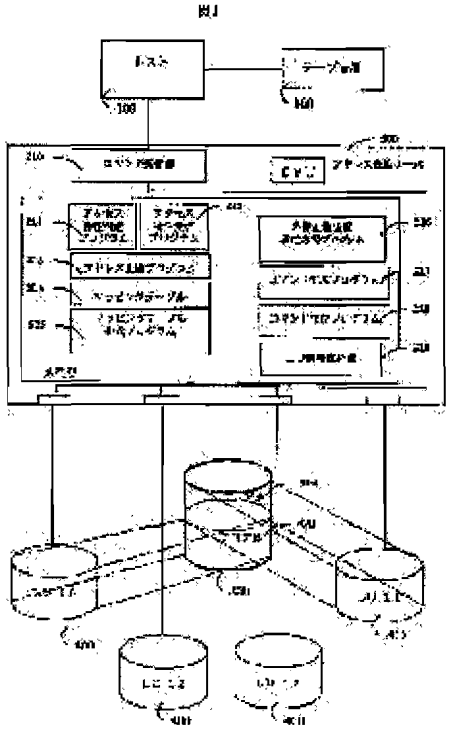
(54) COMPUTER SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To solve the problem that it is impossible to assign a storage device suitable for its purpose of use to a host since a virtual volume is created from a storage region formed of a plurality of storage devices in a virtualization technology.
SOLUTION: An address converting server recognizes and stores the characteristics of a storage device forming a storage region. Also, an address converting server recognizes access characteristics from a host, and prepares and issues a command to the storage device by considering the characteristics of the storage device at the command issue destination. Furthermore, the storage device provides resources matched with the requested access characteristics. The address converting server is provided with an outside storage device attribute setting means for dynamically instructing attribute change according to the change of access conditions from the host to the storage device forming the storage region. Also, the storage device is provided with an LU attribute command receiving program for changing internal control for obtaining the requested attributes.



(Ref. 1, JP 2003-345514 A)

* NOTICES *

CLAIMS

[Claim(s)]

[Claim 1]Have the address translation server connected to a computer, two or more memory storage, and said computer and said two or more memory storage, and said address translation server, A computer system holding the attribute of two or more of said memory storage, judging the access characteristic of a command from said computer, and creating a command published to said memory storage based on the attribute of said memory storage, and access specification of said command.

[Claim 2]The computer system according to claim 1, wherein said address translation server judges the access characteristic based on access characteristic information included in a command received from a host.

[Claim 3]Said address translation server has an external storage attribute acquisition means which acquires the attribute of two or more

of said memory storage, and this external storage attribute acquisition means, The computer system according to claim 2 acquiring the attribute of said external storage by publishing an attribute acquisition command to said two or more memory storage.

[Claim 4]The computer system according to claim 3, wherein said external storage attribute acquisition means acquires an attribute by performing an attribute check test to said two or more memory storage.

[Claim 5]The computer system according to claim 4, wherein said address translation server creates a command containing an attribute.

[Claim 6]A computer.

Two or more memory storage.

An address translation server which performs address translation between said computer and said two or more memory storage.

Are the above the computer system which it had and said address translation server, Judge the access characteristic of a command from said computer, and according to change of an access situation from said computer, Having an external storage attribute setting means for performing attribute changing directions dynamically, said two or more memory storage has LU attribute command reception means for changing internal control so that it may become the attribute demanded from said address translation server.

[Claim 7]The computer system according to claim 6, wherein said access characteristic judging means judges the access characteristic based on access characteristic information included in a command received from said computer.

[Claim 8]The computer system according to claim 7, wherein said access characteristic judging means judges the access characteristic with quantity of a command per unit time which received from said

computer.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention is concerned with memory storage and relates to the art of the virtualization which virtualizes two or more memory storage and with which a computer is especially provided as one storage area.

[0002]

[Description of the Prior Art]There is art called virtualization as art which virtualizes the storage area which two or more memory storage has and with which a computer is provided as one or more virtual storage areas.

[0003]On the other hand, generally memory storage is built by the disk array in many cases. A disk array is memory storage which has the composition which was also called RAID (Redundant Arrays of Inexpensive Disks), and has arranged two or more disk units to array form. The disk array is explained to the paper of "A Case for Redundant Arrays of Inexpensive Disks" (RAID) in detail.

[0004]When assigning the file which a user uses to the storage area which memory storage has, the art in which memory storage chooses the optimal storage area for file assignment automatically is indicated by JP,6-161837,A based on file information, such as the attribute of a file, and space quota classification.

[0005]

[Problem(s) to be Solved by the Invention]When using single memory storage in a computer system, the user of a computer system should just use the memory storage according to the use of the data which a user uses. However, when virtualization art is introduced into a computer system, since the virtual storage area formed from two or more memory storage is used, the user can specify the memory storage which suited the use of the data to be used, and cannot use it.

[0006]Even if the memory storage suitable for the use of data is assigned to a user fixed, when the use of the data which a user uses changes, in the computer system concerned, it cannot respond to the change.

[0007]In the computer system with which virtualization art is used, the purpose of this invention is to realize use of the memory storage according to the use of data.

[0008]

[Means for Solving the Problem]In order to solve said technical problem, an address translation server which realizes virtualization recognizes the characteristic of a storage device which forms a storage pool, and memorizes this invention. An address translation server recognizes the access characteristic from a host, considers the characteristic of a storage device of the command issue point, and creates and publishes a command to a storage device. A storage device provides a resource suitable for the demanded access characteristic.

[0009]In order to solve said technical problem, this invention receives a storage device with which an address translation server which realizes virtualization forms a storage pool, According to change of an access situation from a host, it has an external storage attribute setting program for performing attribute changing directions dynamically. A storage device changes internal control so that it may become the

demanded attribute.

[0010]

[Embodiment of the Invention]Drawing 1 is a figure showing a 1st embodiment of the computer system which applied this invention. In drawing 1, as for a computer system, the host computers 100 (following "host 100") and 200 have the address translation computer (following "address translation server") 200, two or more memory storage 400, and the tape device 500. Neither of the storage system which combined the disk unit of a simple substance or two or more disk units, such as RAID, and a control device is available for the memory storage 400. The combination of memory storage which is different also in the combination of the same memory storage may be sufficient as two or more memory storage 400.

[0011]The storage area which each memory storage 400 has is called Logical unit (LU). Hereafter, LU of two or more memory storage 400 is set to LU10, LU11, LU12, and LU13. LU which the memory storage 400 has may correspond with the storage area over two or more disk units which the memory storage 400 has, even if the memory storage 400 supports the disk unit and the couple 1 which it has.

[0012]In this invention, the address translation server 200 recognizes the attribute of LU which each memory storage 400 has. The attributes of LU may be the basic characteristics, such as access performance from the host 100 which not only the function realized by the memory storage 400 but the memory storage 400 has, and reliability. As an example of a function, the recognition propriety of the special command which the address translation server 200 publishes is mentioned. It is connected with the host 100, and the tape device 500 is used in order to take backup of data.

[0013]The host 100, the address translation server 200 and the address

translation server 200, and the memory storage 400 are connected by a communication wire. The communication wire used here may be any communication wires, for example, the communication wire for which an IP protocol is used, or a communication wire for which the protocol of a fiber channel is used.

[0014]LU300 is a virtual storage area recognized by the host 100. LU300 comprises the area A310 and the area B320. According to this embodiment, the area A310 corresponds to LU10 and the area B320 corresponds to LU11. Although the area A310 and the area B320 are storage areas which each different memory storage 400 has actually, from the host 100, LU300 is recognized as a series of Logical unit.

[0015]The address translation server 200 CPU, a memory, The command from the host 100. The command reception part 210 which receives, the access characteristic decision program 211 which judges the access characteristic of the command from the host 100, the access characteristic receiving agent 212 which receives the access characteristic information included in the command from the host 100, the address conversion program 213, It has the mapping table 214, the mapping table preparing program 215, the external storage attribute acquisition program 216, the command preparing program 217, the command issue program 218, and LU information attaching part 219. CPU executes the program mentioned above.

[0016]The address conversion program 213 is executed when changing the address of LU300 specified by the host 100 into the address which shows LU10, LU11, LU12, and LU13. A correspondence relation with the attribute of LU300, LUs 10-13, and LUs 10-13 is registered into the mapping table 214. According to the composition of the memory storage 400 which a computer system has, the mapping table preparing program 215 is executed, when creating the mapping table 214.

[0017]The external storage attribute acquisition program 216 is executed when acquiring the information which shows the attribute of the memory storage 400 from the memory storage 400. The command preparing program 217 is executed when creating the command to the memory storage 400, such as a write instruction of data.

[0018]Drawing 2 is a figure showing the example of the mapping table 214. Virtual LU number (LUN) and logic block address (LBA) of host LU300 which can be recognized from the host 100 in the mapping table 214, LUN of LU10, LU11 and LU12 which are virtual LBA of the area A310 and the area B320 which is virtual area, and a storage area of each memory storage 400, and LU13, LBA, and an attribute are registered. The correspondence relation of each registered item is also recorded on the mapping table 214.

[0019]The sequential access performance of the memory storage 400, random access performance, evaluation of reliability, the recognition propriety of a command with an attribute, etc. are contained in the attribute of the memory storage 400. According to this embodiment, sequential access performance, random access performance, and the evaluation value of reliability are displayed in five steps, and suppose that it is them such high evaluation that a number is large.

[0020]Drawing 3 is a figure which is acquired when the address translation server 200 executes the external storage attribute acquisition program 216 and in which showing an example of the storage LU information on each memory storage 400. A storage attribute and its evaluation value are contained in storage LU information. The recognition propriety of a command with LU number, capacity size, sequential access performance, random access performance, reliability, and an attribute is contained in a storage attribute. There are some to which some values are not set among the information on drawing 3

depending on the storage LU information acquired from the memory storage 400.

[0021]Drawing 4 is the host 100 and a figure showing the contents of the command which the address translation server 200 publishes. The items corresponding to #1 - #3 are contents included in the usual lead or the command used for a light among the items shown in drawing 4. Specifically, activity, such as read/write, is set to the Op code. The information the value of LBA indicates size to be to size items is set to the item LBA.

[0022]# The information which shows the access characteristic is set to the item corresponding to 4 - #6. The information which shows whether it is a sequential data access is set to a sequential nature item. The information which shows whether it is random access is set to a random nature item. The information which shows whether it is data which needs the level of reliability however is set to a reliability item.

[0023]Next, the preparation method of the mapping table 214 is explained. At the time of initial starting of a system, the address translation server 200 executes the mapping table preparing program 215, and searches the memory storage 400 connected to the address translation server 200. Then, the address translation server 200 executes the external storage attribute acquisition program 216, acquires LU information on the discovered memory storage 400, and stores it in LU information attaching part 219.

[0024]Then, the address translation server 200 publishes commands, such as ModeSense, to the memory storage 400, and acquires storage LU information. Then, based on the acquired storage LU information, the address translation server 200 executes the mapping table preparing program 215, and records the value of memory storage LU and a memory storage attribute on the mapping table 214 at each item.

[0025]There is an item which the memory storage 400 cannot answer depending on storage LU information. In that case, the address translation server 200 executes the external storage attribute acquisition program 216, publishes a lead/write command to the memory storage 400, and measures the value in performance by the access characteristic. Then, the address translation server 200 records a value on the item of a memory storage attribute based on the measured result.

[0026]If there is a demand of LU creation from the host 100, the address translation server 200 will execute the mapping table preparing program 215, and will form host LU combining existing memory storage LU based on storage attribute values, such as a storage capacity of demanded LU, performance, and reliability. What is necessary is just to notify a storage capacity and a storage attribute value to the address translation server 200 from the host 100 at the time of LU preparing request.

[0027]It is shown by drawing 2 that LUN0 which is certain LU300 has a storage capacity which is 200 blocks, LUN0 comprises the area A310 and the area B320, and LBA 0-99 of LU10 and the area B320 comprise LBA 0-99 of LU11 for the area A310. The memory storage attribute is related with LU10 and LU11, respectively.

[0028]Drawing 5 is a flow chart which shows processing of the address translation in the address translation server 200, and command issue. They may be other characteristics although access with sequential nature is assumed as the access characteristic in drawing 5.

[0029]First, the address translation server 200 receives the command which the host 100 published in the command reception part 210 (Step 1001). The address translation server 200 judges whether the access characteristic is sequential based on two or more commands which

executed and received the access characteristic decision program 211. Although there are various ways about the judgment method of the access characteristic, since it is easily realizable by a publicly known method, explanation is omitted (Step 1002).

[0030]If the characteristic of the command received is not the sequential characteristic, the address translation server 200 will create the command which does not have an access attribute (Step 1003), and will publish a command to the memory storage 400 (Step 1004).

[0031]If the characteristic of the command received is the sequential characteristic, the address translation server 200 will judge whether LU of the memory storage 400 corresponding to a command can recognize a command with an attribute with reference to the mapping table 214 (1006) (Step 1007).

[0032]If recognition of a command with an attribute is possible for the memory storage 400, the address translation server 200 will create the command which added the access attribute which shows the sequential characteristic (Step 1008), and will publish a command to the memory storage 400 (Step 1004). In order to add the attribute of a sequential access to a command, let the contents of the sequential nature item of a command be a value which shows Yes. Two or more commands judged that there is sequential nature may be summarized, and one command may be created.

[0033]In Step 1007, when it is judged that the memory storage 400 cannot recognize a command with an attribute, the address translation server 200 creates a command without an access attribute (Step 1009), and publishes a command to the memory storage 400. Even in this case, two or more commands judged that there is sequential nature may be summarized, and one command may be created (Step 1004).

[0034]When the characteristic of access is recorded in the command

received from the host, In Step 1002, the access characteristic receiving agent 212 may be used for the address translation server 200 instead of the access characteristic decision program 211, and it may judge the sequential characteristic of a command.

[0035]For example, the case where the data stored in the tape device 500 at the memory storage 400 is further backed up supposing the host 100 who publishes many random access is considered. The address translation server 200 specifies that it is random access except the time of backup as the memory storage 400, and at the time of a backup process. Since the memory storage 400 side can recognize the access characteristic of the command to receive beforehand if it specifies that it is a sequential access as the memory storage 400, command processing can be carried out efficiently.

[0036]Considering the case where a storage device consists of a disk unit and cash. When it has been recognized that the command received from the address translation server 200 is a sequential access, By publishing the command expected to follow a disk unit beforehand. Staging to cash can be carried out beforehand, and since immediate data can be transmitted from cash in the stage by which access to the address with which staging ended from the address translation server 200 came, the increase in efficiency of command processing can plan. Staging to the cash performed beforehand is easily realizable with publicly known art.

[0037]As the access characteristic recorded into the command received from the host, items, such as reliability, may be sufficient besides performance. Plural may be sufficient as the access characteristic recorded into a command.

[0038]According to this embodiment, the address translation server 200 can assign the host 100 the memory storage suitable for a use by

holding the attribute of the memory storage 400 to a mapping table.

[0039]The address translation server 200 can raise access performance by recognizing the access characteristic from the host 100, considering the characteristic of the memory storage of the command issue point, and creating and publishing the command to memory storage.

[0040]Next, the system configuration of a 2nd embodiment of this invention is explained. The difference from the system shown by drawing 1 is as follows. In addition to drawing 1, the address translation server 200 contains the access characteristic counter 221 which counts the frequency of a command received from the external storage attribute setting program 220 which sets an attribute as the memory storage 400, and the host 100 where it has a certain access characteristic. Values in performance other than sequential nature and locality etc. which are decided by the address specified by a command and size, such as the number of I/O per unit time and data transfer quantity, are included in the access characteristic.

[0041]The address translation server 200 judges the access characteristic by executing the access characteristic decision program 211. The address translation server 200 executes the command preparing program 217, and creates the ModeSelect command for directing change of LU attribute to the memory storage 400.

[0042]Drawing 6 is the memory storage 400 in the first embodiment and this embodiment, and a figure specifically showing the example of composition of the disk array 400. LU10 is logically built inside the memory storage 400 shown in drawing 6.

[0043]The disk array 400 has the disk controller 650, the disk group 651, CPU610, the memory 620, the disk cache 690, and the external interface 640. The disk group 651 has two or more disks 670.

[0044]The RAID control program 601, the cash control program 605, and

the mirror control program 621 are stored in the memory 620. These programs are executed by CPU610. The memory 620 has the cache management table 606 in which the bit map for cache managements is stored.

[0045]The RAID control program 601 is executed when CPU610 controls a disk array. Each disk group 651 has RAID5, i.e., the redundant configuration which used parity. However, the number of disks which each disk group 651 has, and the RAID constitution of each disk group 651 may be, other composition, for example, RAID1 grade.

[0046]The data stored in the disk 670 is saved at the disk cache 690 temporarily. External I/F640 is an interface between other devices, and is a portion used as I/F with the address translation server 200 in this embodiment.

[0047]The storage area which the disk group 651 has is accessed as Logical unit (LU) in a SCSI standard. LU which each of the disk group 651 has is made into LU10 and LU10 , respectively. According to this embodiment, the same data is stored in LU10 and LU10 (following, "doubleness"). LU10 is set to mirror former LU in which original data were stored, and LU10 is set to mirror point LU in which the duplicate of original data is stored. When these LUs double and are not managed, each LU is treated as an independent LU.

[0048]The mirror control program 621 of the disk array 400 has LU mirror sub program 631 and the mirror synchronous sub program 632. LU mirror sub program 631 applies updating to one LU also to another LU specified beforehand, and when it performs mirror-ization which writes in the same user datum as two LUs, it is executed by CPU610. The disk array 400 performs read-out to one LU from any one of two LUs, and reduces disk loads.

[0049]Although the disk array 400 doubles the writing of data to LU10

to LU10 , it can also be considered only as the writing of data to LU10 like usual. When the disk array 400 performs mirror-ization and the mirror synchronous program 632 performs an initial copy to mirror point LU from mirror former LU, it is a program which CPU610 executes.

[0050]The cash control program 605 has the prediction control program 607, the cash resident control program 608, and the cash inhibit control program 609 as a sub program. The prediction control program 607 is executed when CPU610 performs prediction control. The cash resident control program 608 is executed when CPU610 controls LU permanent residence of a up to [the disk cache 690]. The cash inhibit control program 609 is executed when CPU610 performs control which deters the cash advance to the disk cache 690.

[0051]The disk array 400 is executing the prediction control program 607, To the command demanded from the address translation server 200, the data read beforehand is predicted and data other than the demanded data is read into the disk cache 690 from the disk group 651.

[0052]The disk array 400 always stores in the disk cache 690 the data contained at a part of LU or LU by executing the cash resident control program 608. LU always stored in the disk cache 690 is LU etc. which are asked for the high speed response to the address translation server 200, for example.

[0053]When LU attribute command receiving agent 602 receives the ModeSelect command which is an LU attribute command from the address translation server 200, it is executed by CPU610. When the LU information setting program 603 sets up LU attribute based on the ModeSelect command which is a received LU attribute command, it is executed by CPU610. LU attribution information is stored in the LU information table 604. The LU information table 604 exists for every LU.

[0054]Drawing 7 is a figure showing an example of the mapping table 214

in this embodiment. The difference from a 1st embodiment is that the item of an attribute serves as the amount of prediction, cash permanent residence, an inhibit cache, and a mirror. The block count of the logical block by which prediction is carried out is stored in the amount item of prediction. The value stored may be not the block count but a unit which shows other data volume. The information which shows ON which shows that the function corresponding to each item is effective, or OFF which shows that a function is invalid is stored in cash permanent residence, an inhibit cache, and the items of a mirror.

[0055]Drawing 8 is a figure showing an example of the ModeSelect command published by the disk array 400 from the address translation server 200 in this embodiment. # The information as a first embodiment that 1 - #2 are the same is set up. The information which shows respectively the amount of prediction corresponding to the attribute stored in the mapping table 214 of drawing 8, cash permanent residence, an inhibit cache, and a mirror is set as item #3-#6.

[0056]Drawing 9 is a figure showing an example of the access characteristic counter 221 in this embodiment. The number of commands to LU corresponding to LU number, the number of commands with sequential nature, and a timer value are stored in the access characteristic counter 221. The value which shows the time when a timer value operates a counter is stored.

[0057]For example, when the disk array 400 investigates the sequential nature of access, the disk array 400, By comparing with the number of sequential commands the number of commands to a certain LU within a time set as the timer value, the rate of the sequential command of applicable LU is calculated and the sequential nature of access is judged.

[0058]When the disk array 400 investigates the value in performance

demanded by the host 100 using the access characteristic counter 221, the disk array 400 checks a certain number of I/O within a time set as the timer value.

[0059]Drawing 10 is a figure showing the contents of the cache management table 606. The cache address which shows the address in the disk cache 690 in a cache management table, The lead cache hit bit which shows whether the cash advance to the field corresponding to the address of LBA corresponding to a cache address and a cache address is deterred, The permanent residence bit which shows whether the data of the field corresponding to a cache address is data of cash permanent residence is stored.

[0060]Drawing 11 is a figure showing operation of the address translation server in a second embodiment. In drawing 11, as the host s 100 access characteristic, random accesses without sequential nature occur frequently, and the case where accesses with sequential nature occur frequently is assumed after that at the beginning.

[0061]For example, when the host 100 uses the address translation server 200 as database-oriented storage, random access occurs in the usual database access. However, when the host 100 takes backup of data in tape device 500 grade, the operation which reads consecutive addresses from the memory storage which the host 100 uses is needed, and the host 100 becomes sequential access.

[0062]First, the address translation server 200 executes the external storage attribute setting program 220, and creates the ModeSelect command which is LU attribute setting command. Next, the address translation server 200 publishes the ModeSelect command to the disk array 400 using the command issue program 218.

[0063]Supposing random access occurring frequently, as for the command generated at this time, as for the value set up by a command,

0 and cash permanent residence set an inhibit cache to ON, it is set to OFF, and a mirror is set to OFF for the amount of prediction. When taking the capacity of the disk cache 690 into consideration, it is good also considering cash permanent residence as OFF.

[0064]The disk array 400 executes LU attribute command receiving agent 602, and receives the published ModeSelect command. Then, the disk array 400 sets LU attribution information included in the ModeSelect command which executed the LU information setting program 603 and was received as the LU information table 604 (Step 2001).

[0065]The address translation server 200 supervises the command from the host 100, and calculates the access characteristic at the access characteristic counter 221. According to this embodiment, it is calculated whether it is access with sequential nature. The same method as a first embodiment may be sufficient as the method of judging sequential performance. Since calculation to a counter is carried out asynchronously, it is not indicated to be Step 2001 or subsequent ones to drawing 11.

[0066]It is investigated whether the address translation server 200 exceeded a constant rate of thresholds with a sequential access with reference to the access characteristic counter 221 (Step 2003) one by one to the amount of commands received from the host 100 (Step 2004). When a sequential access does not exceed a threshold, the address translation server 200 processes Step 2003.

[0067]When a sequential access exceeds a threshold, the address translation server 200 executes the external storage attribute setting program 220, and creates the ModeSelect command which is LU attribute setting command. Next, the address translation server 200 executes the command issue program 218, and publishes the

ModeSelect command to the disk array 400.

[0068]The ModeSelect command created at this time is made into the value supposing sequential accesses occurring frequently, the amount of prediction shall be 32 blocks and an inhibit cache is set to ON. It is because a possibility that ON, i.e., the reason for not carrying out a cash advance, will be deleted from the disk cache 690 in an inhibit cache before the demanded data is used again, since access from the host 100 is a sequential access is high (Step 2005). The address translation server 200 performs processing of Step 2003 after command issue.

[0069]Besides the example of the sequential access described by drawing 11, with the same procedure, the address translation server 200, Change of the access characteristic can be calculated at the access characteristic counter 221, and the ModeSelect command which is LU attribute setting command can be published to the disk array 400 according to a state. For example, the number of I/O per unit time from the host 100 increases, by the capability of the disk unit which is working, when it is becoming insufficient, a mirror can be turned ON and the disk unit used for I/O can also be increased.

[0070]When the address translation server 200 recognizes the access characteristic of the command received from the host 100, it may be made to recognize by transmitting a command with an attribute from the host 100 like the flow of drawing 5 shown by a 1st embodiment.

[0071]Next, operation of the disk array 400 which receives the ModeSelect command which is LU attribute setting command is explained. The disk array 400 receives the ModeSelect command which is LU attribute setting command from the address translation server 200 by executing LU attribute command receiving agent 602.

[0072]Next, the disk array 400 executes the LU information setting

program 603, and stores in the LU information table 604 the contents included in LU attribute setting command. Henceforth, the disk array 400 determines the amount of prediction, cash permanent residence, an inhibit cache, and each control method of a mirror according to the information stored in the LU information table 604.

[0073]When the amount of prediction of the LU information table 604 is not 0, the disk array 400, According to the amount of prediction set as the LU information table 604, the data for the set-up amount of prediction is read into the disk cache 690 from the disk group 651 to the command demanded from the address translation server 200.

[0074]When the cash permanent residence information on the LU information table 604 is ON, the disk array 400 controls the disk cache 690 to station permanently a part of applicable LU or LU at the disk cache 690. In OFF, it controls not to make it reside permanently. The disk array 400 specifically executes the RAID control program 601, With reference to the cache management table 606, it is judged whether the address of LBA stored corresponding to the cache address which shows the position in the disk cache 690 is an address which shows the position of the data which should carry out cash permanent residence.

[0075]When the inhibit cache information on the LU information table 604 is ON, the disk array 400 controls the disk cache 690 to deter carrying out the cash advance of a part of LU or LU to the disk cache 690. In OFF, it controls not to deter.

[0076]The disk array 400 specifically performs the RAID control means 601, With reference to the cache management table 606, it is judged whether the address of LBA stored corresponding to the cache address which shows the position in the disk cache 690 is an address of the data in which a cash advance should be deterred.

[0077]When the mirror information on the LU information table 604 is

ON, the disk array 400 executes the mirror control program 621, and carries out mirroring of the access to LU10 to LU10 . The disk array 400 executes the mirror synchronous program 632 first, and, specifically, copies LU10 to LU10 . Then, the disk array 400 carries out the mirror of the access to LU10 using LU mirror sub program 631.

[0078]The disk array 400 is setting the mirror information on the LU information table 604 to ON, and changing it into a mirror attribute, when the load to random access has been applied based on directions of the address translation server 200, It is possible to increase the number of disc stands and to raise a read-out value in performance.

[0079]In this embodiment, although the value in performance of the disk array 400 was changed by the mirror, the value in performance of the disk array 400 may be changed by change of an option, for example, the RAID level to LU10, and the disk unit addition in the same RAID constitution. Mirroring may be three or more multiplex mirroring.

[0080]According to this embodiment, the disk array 400 can carry out a response suitable for the access request from the host 100 because the address translation server 200 specifies an attribute required for the disk array 400 dynamically.

[0081]When the number of commands which the host 100 publishes according to the increase in the number of clients has increased in this embodiment, Based on directions of the address translation server 200, the disk array 400 can increase the number of disk units used for processing, and can meet the host s 100 demand.

[0082]

[Effect of the Invention]As stated above, according to this invention, the address translation server which realizes virtualization can assign a host the memory storage suitable for a use. The address translation server can raise the access performance of the whole system.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a system configuration figure in a 1st embodiment.

[Drawing 2]It is an explanatory view of the mapping table in a 1st embodiment.

[Drawing 3]It is an explanatory view of the storage LU information in a 1st embodiment.

[Drawing 4]It is an explanatory view of the command in a 1st embodiment.

[Drawing 5]It is a flow chart of address translation and command issue operation in a 1st embodiment.

[Drawing 6]It is a lineblock diagram of the disk array 400.

[Drawing 7]It is an explanatory view of the mapping table in a 2nd embodiment.

[Drawing 8]It is an explanatory view of the command in a 2nd embodiment.

[Drawing 9]It is an explanatory view of the access characteristic counter in a 2nd embodiment.

[Drawing 10]It is an explanatory view of the cache management table in a 2nd embodiment.

[Drawing 11]It is a flow chart of LU attribute designation command issue operation in a 2nd embodiment.

[Description of Notations]

100 [-- Tape device.] -- A host, 200 -- An address translation server, 400 -- Memory storage, 500